JOURNAL
OF THE
WASHINGTON ACADEMY OF SCIENCES

VOL. 16 NOVEMBER 3, 1926 No. 18

BOTANY.—*The Costa Rican Species of Ilex.*[1]

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No representative of the genus *Ilex* (holly) had been reported from Central America until 1925, when I published in this JOURNAL[2] descriptions of three new species which I had collected in Costa Rica in 1924. During the Costa Rican trip of that year the genus was not noticed until nearly the end of the season, consequently few specimens were collected. It seemed remarkable, however, that a genus represented by three species should not have been detected by some of the numerous botanists who had visited that country.

During the winter of 1925–26 I spent several months more in Costa Rica, and it now seems even more remarkable that the genus was not observed there earlier. Special attention was given this season to study of the genus, with the result that shrubs and trees of *Ilex* were found to be plentiful nearly everywhere in the mountains of central Costa Rica, and in some localities probably 30 per cent of the shrubbery consisted of plants of this genus. Individuals with flowers or fruit are comparatively scarce, and it may be on this account that the group has been overlooked by most collectors.

More than 30 numbers of *Ilex* were collected in Costa Rica this season. Study of them indicates that they represent six species, three of which are described here as new. The following key indicates the relationships of the Costa Rican species, which are the only members of their family known from Central America. It is probable that the genus may be found also in the mountains of western Panama.

[1] Published by permission of the Secretary of the Smithsonian Institution. Received Aug. 3, 1926.

[2] 15: 476–477. 1925.

KEY TO SPECIES

Leaves rounded or very obtuse at apex, crenate.
  Leaves coarsely and conspicuously punctate beneath, not emarginate. 1. *I. vulcanicola.*
  Leaves not punctate beneath, usually emarginate at apex....2. *I. tristis.*
Leaves acute or acuminate, entire, crenate-serrate, or appressed-serrate.
  Branchlets densely and finely pubescent. Leaves appressed-serrate. 3. *I. pallida.*
  Branchlets glabrous.
    Leaves entire....4. *I. valerii.*
    Leaves crenate-serrate.
      Leaf blades elliptic, coarsely crenate-serrate; calyx lobes in fruit acutish....5. *I. lamprophylla.*
      Leaf blades oblong to oblong-elliptic, remotely crenate-serrate with appressed teeth; calyx lobes in fruit broadly rounded. 6. *I. carpinterae.*

1. ILEX VULCANICOLA Standl. Journ. Washington Acad. Sci. **15**: 477. 1925.

The type was collected at Las Nubes. The following additional collections, at altitudes of 2,000 to 2,400 meters, may be reported: Cerro de las Caricias, Province of Heredia, *Standley & Valerio* 52021, 52197, 52256, 52291. The type collection was described as an epiphytic shrub, and it is not improbable that this species may be at times an epiphyte. Usually it is a shrub of 1.5 to 3 meters, growing in wet forest. The leaves are pale green and 1.5 to 5 cm. long. On young plants they are often obovate-oblong, and much narrower than on mature plants.

2. **Ilex tristis** Standl., sp. nov.

Shrub or tree, 3–12 meters high, the young twigs stout and densely leafy, often sparsely hirtellous; petioles stout, 3–4 mm. long, glabrous; leaf blades broadly elliptic or obovate-elliptic, 2.5–4 cm. long, 2–3 cm. wide, broadly rounded and emarginate at apex, rounded or very obtuse at base, coriaceous, coarsely crenate with about 7 crenations on each side, dark green above, paler beneath, glabrous, the costa and lateral nerves prominent beneath; flowers and fruit unknown.

Type in the U. S. National Herbarium, no. 1,251,406, collected in wet forest on Cerro de las Vueltas, Provincia de San José, Costa Rica, altitude 3,000 meters, Dec. 29, 1925, by Paul C. Standley and Juvenal Valerio (no. 43670).

No. 43578, from the same locality, also belongs to this species. It is probable that the following additional collections are referable here: Laguna de la Chonta, Provincia de San José, alt. 2,100 meters, *Standley* 42169. Near Finca La Cima, north of El Copey, Provincia de San José, alt. 2,400 meters, *Standley* 42608. Both these collections were taken from immature shrubs, with foliage more luxuriant than on mature trees, some of the leaves being as much as 8 cm. long.

Ilex tristis is a common tree in the dense, cold, wet forest bordering the paramos about the summit of Cerro de las Vueltas.

3. **Ilex pallida** Standl., sp. nov.

Shrub 1.5–3 meters high, the branchlets grayish, densely puberulent or short-pubescent, densely leafy; petioles stout, 5–7 mm. long, sparsely puber-

ulent; leaf blades oblong-elliptic or elliptic, 4–9 cm. long, 1.7–4 cm. wide, acuminate, often abruptly so, at base obtuse, coriaceous, dark green (pale green and not blackening when dried), remotely appressed-serrate or subentire (teeth about 9 on each side; sometimes as many as 18), glabrous in age but when very young sparsely pubescent above along the costa; staminate flowers 4-parted, borne in 2 or 3-flowered, solitary or geminate, axillary umbels; peduncles 5–7 mm. long, glabrous, the pedicels about 3 mm. long; calyx 1.5 mm. broad, the lobes broadly rounded; petals white.

Type in the U. S. National Herbarium, no. 1,251,651, collected on Cerros de Zurquí, northeast of San Isidro, Provincia de Heredia, Costa Rica, altitude about 2,300 meters, March 3, 1926, by Paul C. Standley and Juvenal Valerio (no. 50608).

The following sterile specimens also belong to this species: Near Finca La Cima, north of El Copey, Provincia de San José, alt. 2,400 meters, *Standley* 42729. Cerro de las Vueltas, Provincia de San José, alt. 3,000 meters, *Standley & Valerio* 43753.

In general appearance *I. pallida* is much like *I. lamprophylla*, but the leaves do not blacken in drying as in that species, the leaves of which are coarsely crenate-serrate. The densely pubescent branches of *I. pallida* distinguish it from all other Costa Rican species.

4. **Ilex valerii** Standl., sp. nov.

Tree 4.5 meters high, glabrous throughout; branchlets densely leafy; petioles stout or slender, 1–2.5 cm. long, reddish; leaf blades elliptic-oblong to broadly lance-oblong or elliptic, 5–8.5 cm. long, 3–4 cm. wide, rather abruptly acute or acuminate, at base broadly rounded and often short-decurrent, coriaceous, entire, blackening when dried, not punctate beneath; inflorescences solitary, umbelliform, 3 to 6-flowered, the peduncles 1.8–2.5 cm. long, the pedicels 2–3 mm. long; calyx green, 3 mm. broad, the 4 lobes ovate-deltoid, acutish; petals 4, white, 3.5 mm. long.

Type in the U. S. National Herbarium, no. 1,251,513, collected on the Cerros de Zurquí, northeast of San Isidro, Provincia de Heredia, Costa Rica, altitude about 2,300 meters, March 3, 1926, by Paul C. Standley and Juvenal Valerio (no. 50582).

Ilex valerii is named for Prof. Juvenal Valerio, in whose company it was collected. Prof. Valerio, an enthusiastic student of the Costa Rican flora, accompanied me nearly all the time that I spent in Costa Rica this year. To him I am deeply indebted for unstinted assistance, and for many attentions which contributed largely to the success of this season's work.

This species is very distinct from all others known from Costa Rica in its long-petioled entire leaves and long-pedunculate inflorescences.

5. ILEX LAMPROPHYLLA Standl. Journ. Washington Acad. Sci. **15**: 476. 1925.

The type was collected at La Estrella, Province of Cartago. The following additional collections, at altitudes of 1,400 to 2,400 meters, may be reported: Cerro de las Caricias, Provincia de Heredia, *Standley & Valerio* 52012, 52200, 52273, 52260. Cerro de las Lajas, Provincia de Heredia, *Standley & Valerio* 51539. Yerba Buena, Provincia de Heredia, *Standley & Valerio* 49860, 49816, 49709. Fraijanes, Provincia de Alajuela, *Standley & Torres* 47443,

47423. El Muñeco, Provincia de Cartago, *Standley & Torres* 51332, 51275, 51177.

This is the most common Costa Rican species of *Ilex*, a shrub or tree of 2.5 to 9 meters, with smooth bark, dark green leaves, and greenish white flowers. It grows always in wet forest.

6. ILEX CARPINTERAE Standl. Journ. Washington Acad. Sci. **15**: 477. 1925.

The type was collected on Cerro de la Carpintera, Province of Cartago. The following new collections, at 1,400 to 2,400 meters, may be reported: Cerros de Zurquí, Provincia de Heredia, *Standley & Valerio* 50597. El Muñeco, Provincia de Cartago, *Standley & Torres* 50881, 50918, 50926.

This species is very close to *I. lamprophylla*, and doubtfully distinct. More material will be necessary in order to determine its status. It is a shrub or tree of 2 to 6 meters, with dark green, usually lustrous leaves.

BOTANY.—*Notes on the Genus Sanchezia.*[1] E. C. LEONARD, U. S. National Museum. (Communicated by E. P. KILLIP.)

Sanchezia, a genus of the family *Acanthaceae*, tribe *Ruellieae*, was briefly described[2] by Ruiz and Pavón in 1794, and four years later was formally published by these authors,[3] two species, *S. ovata*, the type, and *S. oblonga* being described. From that time on, no further study of this interesting genus seems to have been made until 1847, when it was redescribed by Nees in Martius' Flora Brasiliensis[4] under the name *Ancylogyne*. Nees proposed two species, *A. munita* and *A. macrocnemis;* the latter proves to be identical with *S. oblonga* Ruiz & Pavón. In his treatise upon the family *Acanthaceae* in DeCandolle's Prodromus,[5] published the same year, Nees adds *A. peruviana* and *A. capitata*. Hooker in 1866 re-established[6] the old generic name, *Sanchezia*, and added the species *S. nobilis*. The only recent attempt to bring together all the members of this genus is that by Lindau,[7] who published a key which included ten species.

The genus was named for José Sánchez, a professor of botany at Cádiz. It consists of shrubby or herbaceous plants with large firm leaves, and attractive, bright yellow or purple, sessile flowers in spikes or racemes. The most reliable characters by which the genus may be

[1] Published by permission of the Secretary of the Smithsonian Institution. Received September 23, 1926.

[2] Fl. Peruv. Chil. Prodr. 5. *pl. 32.* 1794.

[3] Fl. Peruv. Chil. 1: 7. *pl. 8, f. c, b.* 1798.

[4] Mart. Fl. Bras. 9[7]: 63. 1847.

[5] DC. Prodr. 11: 221. 1847.

[6] In Curtis' Bot. Mag. **92**: *pl. 5594.* 1866.

[7] Bull. Herb. Boiss. II. **4**: 315. 1904.

recognized are found in the flowers; the corolla is slender and nearly regular with suborbicular, entire or emarginate lobes; the two stamens, usually exserted, are accompanied by a pair of staminodes.

Natives of tropical America, these plants are confined to the wet forests of the northern Andes, but, being both attractive and adaptable to cultivation, they have reached regions far removed from their natural haunts. Collections have been seen from Costa Rica, Cuba, Java, Siam, and Amboina.

Nineteen species are described in the present paper, and there is reason to believe that many more will be discovered when the rich fields of the tropical Andes have been more thoroughly explored.

KEY TO THE SPECIES

Bracts large, conspicuous, ovate, longer than the bractlets or the sepals, inclosing the flowers in a cuplike involucre.
- Leaves pubescent ..... 1. *S. ovata.*
- Leaves glabrous.
  - Corolla 3 cm. long or less; stamens slightly exserted ..... 2. *S. oblonga.*
  - Corolla 4 cm. long or more; stamens distinctly exserted.
    - Staminodes 2 mm. long ..... 3. *S. munita.*
    - Staminodes 4 mm. long or longer.
      - Corolla densely pubescent with straight silky appressed hairs ..... 4. *S. sericea.*
      - Corolla glabrous or sparsely pubescent with minute curved hairs.
        - Corolla pubescent, yellow or purple.
          - Flowers yellow; leaf blades finely undulate-dentate ..... 5. *S. macbridei.*
          - Flowers purple; leaf blades coarsely undulate-dentate ..... 6. *S. peruviana.*
        - Corolla glabrous, yellow.
          - Bracts connate at least to middle.
            - Lateral nerves 15 to 17 on either side of the midrib; corolla lobes 5 mm. long ..... 7. *S. cyathibracteata.*
            - Lateral nerves 9 to 12 on either side of the midrib; corolla lobes 3 mm. long ..... 8. *S. pennellii.*
          - Bracts not connate.
            - Leaf blades rounded at base; petiole slender; corolla tube 4 to 6 mm. broad ..... 9. *S. stenantha.*
            - Leaf blades gradually narrowed to a winged petiole; corolla tube 8 to 9 mm. broad.
              - Staminodes short, about 5 mm. long ..... 10. *S. nobilis.*
              - Staminodes about 2.5 cm. long ..... 11. *S. speciosa.*

Bracts small, ovate or oblong, usually shorter than bractlets or sepals or, if much longer, linear-attenuate, not inclosing the flowers in a conspicuous cuplike involucre.
- Inflorescence capitate ..... 12. *S. capitata.*

Inflorescence spicate or paniculate.
Bracts filiform, equaling or larger than the flowers....13. *S. filamentosa.*
Bracts ovate or oblong, much shorter than the flowers.
Staminodes very short, about 2 mm. long; inflorescence spicate 3. *S. munita.*
Staminodes 1 cm. long or more; inflorescence paniculate (sometimes spicate in no. 17).
Flowers red or purplish.
Corolla 3 cm. long; stamens included.....14. *S. parviflora.*
Corolla 4 cm. long or more; stamens exserted.
Calyx lobes oblong, obtuse.....15. *S. loranthifolia.*
Calyx lobes lanceolate, acute.
Corolla 5 cm. long; inflorescence a large elongate branched panicle.....16. *S. longifolia.*
Corolla 4 cm. long; inflorescence very small, a spike or a sparingly branched panicle.....17. *S. sprucei.*
Flowers yellow.
Corolla 5 to 5.5 cm. long; stamens exserted 5 cm. beyond the corolla tube; lateral veins 12 to 14 on each side of the midrib 18. *S. parvibracteata.*
Corolla 4.5 cm. long; stamens slightly exserted; lateral veins 9 to 10 on each side of the midrib.....19. *S. ecuadorensis.*

1. SANCHEZIA OVATA Ruiz & Pavón, Fl. Peruv. Chil. **1**: 7. *pl. 8, f. c.* 1798.

Sanchezia glabra Pers. Syn. Pl. **1**: 24. 1805.

A herbaceous plant with glabrous yellow flowers and ovate entire pubescent leaves, reported by Ruiz and Pavón from Cuchero, Pozuzo, and Pillao in the vicinity of Chachauassi, Peru.

2. SANCHEZIA OBLONGA Ruiz & Pavón, Fl. Peruv. Chil. **1**: 7. *pl. 8, f. b.* 1798.

Sanchezia hirsuta Pers. Syn. Pl. **1**: 24. 1805.
Ancylogyne macrocnemis Nees in Mart. Fl. Bras. **9**[7]: 63. *pl. 7.* 1849.

A herbaceous plant with oblong-lanceolate glabrous leaves and pubescent yellow flowers, reported by Ruiz and Pavón from the same localities as the preceding.

3. SANCHEZIA MUNITA (Nees) Planch. Fl. Serr. Jard. **23**: 257. 1883.

Ancyclogyne munita Nees in Mart. Fl. Bras. **9**[7]: 63. *pl. 7.* 1847.

Type collected by Martius in woods along the Madeira River, Province of Rio Negro, Brazil.

An erect shrub about one meter high, with red flowers.

4. **Sanchezia sericea** Leonard, sp. nov.

Plant shrubby, 1.5 meters high; stems quadrangular, glabrous; leaves oblong-obovate, 15 to 30 cm. long, 7 to 11 cm. wide, rather abruptly narrowed at apex to an acuminate tip, gradually narrowed from below the middle to a short winged petiole, distinctly undulate-dentate, both surfaces glabrous and bearing numerous cystoliths 0.5 to 0.75 mm. long, the lateral veins 14 or 15 on each side of the midrib; inflorescence terminal, simple, equaling or slightly

exceeding the upper pair of leaves, the rachis glabrous or slightly puberulent, the flowers 6 or more, sessile, crowded in the axils of the bracts and forming fascicles 2 to 5 cm. wide; bracts ovate, up to 5 cm. long, 2.5 to 3 cm. broad (the immature smaller), dark red, glabrous, bearing cystoliths; bractlets oblong-ovate, 3 to 4 cm. long, 1 to 1.5 cm. wide, obtuse, pubescent; sepals narrowly obovate, 2.5 to 2.8 cm. long, the 2 outer 5 to 6 mm. broad, the 3 inner 3 to 4.5 mm. broad; corolla pale yellow, the tube 5 cm. long, 7 to 8 mm. wide at throat, gradually narrowed from middle to 3 mm. at base, silky-pubescent without, the lobes 4 mm. long, 2 mm. wide, emarginate; stamens 4 to 4.5 cm. long, attached to the corolla tube about 4 mm. above the base, slightly exserted; staminodes 4 to 5 mm. long; style 4 to 4.5 cm. long, glabrous; ovary 4 mm. long; fruit not seen.

Type in the U. S. National Herbarium, no. 1,196,524, collected on the moist banks of the Pastaza River between Baños and Cashurco, Province of Tungurahua, Ecuador, altitude 1,300 to 1,800 meters, September 25, 1923, by A. S. Hitchcock (no. 21801).

Sanchezia sericea differs from other species of this genus in the large, strongly undulate-dentate leaves and densely silky-pubescent corolla.

5. **Sanchezia macbridei** Leonard, sp. nov.

Herbaceous (?), about 1.5 meters high; stem glabrous, quadrangular; leaves elliptic-oblong, 20 to 30 cm. long, 8 to 12 cm. wide (the lowermost probably larger), abruptly acuminate at apex, narrowed to a short winged petiole with a somewhat clasping base, glabrous, entire or finely undulate-dentate, the cystoliths scattered, the lateral veins 14 to 18 on each side of the midrib; inflorescence spicate, or occasionally with a few branches, equaling or slightly shorter than the upper pair of leaves, the internodes 2 to 9 cm. long, the flowers 10 or more, clustered in the axils of the bracts; bracts ovate, 3 to 5 cm. long, 3 cm. or less broad at base, the lower abruptly long-acuminate, the upper obtuse at apex, red, glabrous, bearing cystoliths; bractlets oblong, 2.5 cm. long, about 1 cm. broad, obtuse at apex; sepals ligulate-obovate, rounded at apex, the 3 outer 2 to 2.5 cm. long, 3 to 6 mm. broad, the 2 inner 1.5 to 1.8 cm. long, 2 to 4 mm. broad; corolla yellow, the tube 5 cm. long, finely pubescent without, the lobes 4 to 5 mm. long, 2.5 mm. broad, rounded at apex; stamens inserted on the corolla tube about 5 mm. above the base, the filaments 4.5 cm. long, exserted 5 mm. beyond the throat of the corolla, sparingly pilose; staminodes 1.5 to 1.8 cm. long; style 6 cm. long, pubescent toward the base; fruit not seen.

Type in the herbarium of the Field Museum of Natural History, no. 536099, collected on the edge of a sunny motaña, at the mouth of the Chinchao River, Pampayacu, Peru, altitude about 1,200 meters, July, 1923 by J. F. Macbride (no. 5056).

From dried specimens this plant superficially resembles *S. peruviana* (DC.) Rusby, but, when fresh, it is readily distinguished by its larger yellow, not red, flowers.

6. SANCHEZIA PERUVIANA (DC.) Rusby, Mem. Torrey Club **6**: 103. 1896.

Ancylogyne peruviana DC. Prodr. **11**: 222. 1847.
Type collected by Matthews (no. 1221) at Sesuija, Peru.

Specimens examined:

PERU: Pozuzo, *J. F. Macbride* 4665 (N, F).[8]

BOLIVIA: San Carlos, Mapiri, *Buchtien* 1403 (N, Y); *Bang* 1473 (N, G), 2367 (N, G).

JAVA: Cultivated in the Buitenzorg Botanical Garden, 237 (N).

SIAM: Bangkok, *Zimmermann* 50 (N).

A shrub, often cultivated for its showy purple flowers.

7. SANCHEZIA CYATHIBRACTEATA Milbr. Notizbl. Bot. Gart. Berlin **9**: 267. 1925.

Type collected at the mouth of the Capanahua River, eastern Peru, by Tessmann (no. 3134).

A shrub with glabrous yellow flowers and large red connate bracts. This species is closely related to the following.

8. **Sanchezia pennellii** Leonard, sp. nov.

Low shrub; stem obscurely quadrangular, glabrous; petioles 4 cm. long, glabrous, scarcely winged; leaf blades elliptic to elliptic-obovate, 10 to 30 cm. long, 5 to 13 cm. broad, abruptly narrowed at apex to a blunt tip, gradually narrowed at base, shallowly crenate, both surfaces glabrous and bearing cystoliths 0.5 mm. long, the lateral veins 9 to 12 on each side of the midrib; inflorescence spicate, the flowers 6 to 8, sessile, crowded in the axils of the bracts and forming fascicles 3 to 6 cm. in diameter; bracts 5 cm. long, connate half their length, loosely inclosing the flower clusters, the free portion broadly ovate, 3 to 3.5 cm. wide, rather abruptly narrowed to a blunt apex, orange-red on at least the upper portion, glabrous, bearing cystoliths; bractlets elliptic-obovate, 2.5 cm. long, 1 cm. broad, bearing cystoliths; sepals ligulate-obovate, 10 to 15 mm. long, the 3 outer 3 to 5 mm. broad, the 2 inner 2 to 3 mm. broad, rounded at apex, glabrous; corolla yellow, 4 to 5 cm. long, 6 to 7 mm. broad at throat, gradually narrowed from middle to 2 mm. at base, glabrous, the lobes oblong, 3 mm. broad, rounded and emarginate at apex; stamens attached to the corolla tube 5 mm. above its base, the filaments 4 cm. long, exserted 8 mm. beyond the throat of the corolla, pilose; staminodes 4 to 5 mm. long; style 5.5 cm. long, glabrous; fruit not seen.

Type in the U. S. National Herbarium, no. 1,043,822, collected in a sandy loam forest along the Magdalena River at Vuelta de Acuña, Department of Antioquía, Colombia, altitude 125 to 130 meters, January 14, 1918, by F. W. Pennell (no. 3798).

Additional specimens examined:

PANAMA: Forests around Pinogana, southern Darién, *Pittier* 6527 (N). Marraganti, *Williams* 659 (N, Y).

COLOMBIA: Brazo de Moro, on the Magdalena River above Barranca Bermeja, *Niemeyer* 1 (N). Boca Verde, on the Sinu River, Department of Bolívar, *Pennell* 4573 (Y, G).

Sanchezia pennellii is closely allied to *S. cyathibracteata* Milbr. and agrees well with the original description of that species except that it has smaller corolla lobes and fewer lateral leaf veins. The five ample specimens cited

[8] N = U. S. National Museum; Y = Herbarium of the New York Botanical Garden; G = Gray Herbarium; F = Herbarium of the Field Museum of Natural History.

are uniform and show no variation other than in the size of the leaf blades and inflorescence. There is no indication that the leaves bear as many as 15 lateral veins on each side of the midrib or that the corolla lobes reach 5 mm. in length. Further ground for proposing this new species is afforded by its range. All the specimens examined by the writer were collected in the forests of northern Colombia and southern Panama, whereas the type of *S. cyathibracteata* was collected in the wet forests of the Amazon Basin in eastern Peru, two regions with very different floras.

The material in the U. S. National Herbarium was distributed as *S. nobilis* Hook. f., which, although closely related, has distinct bracts and narrower leaves with more broadly winged petioles.

9. **Sanchezia stenantha** Leonard, sp. nov.

A glabrous shrub about 1 meter high; stems quadrangular; petioles slender, 4 to 6 cm. long; leaf blades ovate, 10 to 20 cm. long, 8 to 13 cm. wide (the lower probably larger), abruptly acuminate at apex, rounded at base, undulate, the cystoliths more numerous on the upper surface than on the lower, the lateral veins 9 to 11 on each side of the midrib; inflorescence a terminal interrupted spike, the internodes 3 to 7 cm. long, the flowers 6 or more, crowded in the axils of the bracts; bracts ovate, 3 to 4 cm. long, up to 2.5 cm. broad at base, acute at apex, with few cystoliths; bractlets oblong-obovate, slightly shorter than the bracts, the cystoliths few; sepals equal, narrowly obovate, rounded at apex, the 2 outer 6 to 8 mm. broad, the 3 inner 4 to 5 mm. broad; corolla bright yellow, glabrous, 4.8 cm. long, 4 to 5 mm. broad at base, 6 to 7 mm. wide above middle, narrowed at throat, the lobes oval, 3 mm. long, 3.5 mm. broad, emarginate, reflexed; stamens inserted on the corolla tube 5 mm. above its base, 4 cm. long, exserted 8 to 12 mm. beyond the corolla tube, sparsely pilose; anthers 5 mm. long, pubescent; staminodes 1.3 to 1.4 cm. long; style equaling or slightly longer than the stamens, glabrous; fruit not seen.

Type in the herbarium of the Field Museum of Natural History, no. 535709, collected in a stream at Pozuzo, Peru, altitude about 650 meters, January, 1923, by J. F. Macbride (no. 4634).

This species is a very distinct one, easily recognized by the broad ovate leaf blades with round bases, the slender wingless petiole, and the narrow corolla tube.

10. SANCHEZIA NOBILIS Hook. f. in Curtis' Bot. Mag. **92:** *pl. 5594.* 1866.

The original description was based on material collected by Pearce in Ecuador. Although there is little in this description to differentiate *S. nobilis* from closely related glabrous yellow-flowered species, the accompanying plate discloses a number of important and interesting facts. The branched inflorescence and distinct bracts of the plant pictured in this colored plate contrast sharply with the large spike and connate bracts of *S. pennellii* Leonard and *S. cyathibracteata* Milbr. The resemblance to *S. speciosa* Hook. f. is, however, much closer. In the original description Hooker states that the leaf blades are either oblong-obovate or oblong-lanceolate. The colored plate shows a

plant with leaves strongly oblong-obovate, very different from the oblong-elliptic leaves of *S. speciosa*. Figure 2 in this plate is a longitudinal section of a flower, showing clearly the very short staminodes, scarcely 5 mm. long, which are characteristic of *S. pennellii* and *S. cyathibracteata*, but not like the long slender ones found in *S. speciosa*.

It is interesting to note that this species is not represented in the U. S. National Herbarium, although the majority of the specimens of *Sanchezia* had been determined as *S. nobilis*, and doubtless much of the material referred to *S. nobilis* in other herbaria belongs to other species.

11. **Sanchezia speciosa** Leonard, sp. nov.

Plant shrubby; stem quadrangular; leaves oblong-elliptic, 10 to 25 cm. long, 3 to 7 cm. broad (the lowermost probably larger), tapering to a slender blunt apex, gradually narrowed to a short winged petiole (sometimes rather abruptly narrowed at base), both surfaces glabrous and bearing curved cystoliths 0.5 mm. long, undulate or shallowly undulate-dentate, the lateral veins 9 to 12 on each side of the midrib; inflorescence an interrupted spike (or with a few short branches), equaling or exceeding the upper pair of leaves, the internodes 1 to 3 cm. long, the flowers 3 or more in the axils of the bracts and forming fascicles 1 to 2 cm. broad; bracts ovate, blunt at apex, glabrous, bearing cystoliths; bractlets about 2 cm. long, 8 mm. broad, obtuse at apex; sepals ligulate, 1.5 to 1.8 cm. long, 3 to 5 mm. wide, rounded at apex; corolla yellow (?), the tube 4 to 5 cm. long, 7 to 8 cm. broad at throat, narrowed below the middle to 3 mm., glabrous, the lobes 3 to 4 mm. long, rounded, emarginate; stamens inserted about 5 mm. above the base of the corolla tube, the filaments 4 to 4.5 cm. long, exserted 5 to 15 mm. beyond the throat of the corolla, sparingly pilose; anthers 5 mm. long; staminodes 2.5 cm. long; style about 5 cm. long, equaling or exceeding the stamens; fruit not seen.

Type in the U. S. National Herbarium, no. 522,243, collected in the Botanical Garden of Havana, Cuba, January, 1905, by A. H. Curtiss (no. 622). Another specimen was collected from the same place and probably from the same plant by Van Hermann (no. 2700).

Additional specimen examined:

MARTINIQUE: *Duss* 835 (Y).

Both the type and Van Hermann's no. 2700 had been referred to *S. nobilis*. They differ from this species in having much longer staminodes and narrower, more pointed leaves. The colored plate of *S. nobilis* Hook. f. in Curtis' Magazine shows a plant with obovate leaf blades gradually tapering to a broadly winged base.

The type was collected from a plant grown in cultivation and its native country is unknown. It was probably procured from the Andean region in Peru or Ecuador, the center of distribution for the genus *Sanchezia*.

12. SANCHEZIA CAPITATA (Nees) Lindau, Bull. Herb. Boiss. II. **4**: 315. 1904.

Ancylogyne capitata Nees in DC. Prodr. **11**: 222. 1847.

Type collected by Matthews (no. 1230) at Pangoa, Peru.

This peculiar capitate-flowered *Sanchezia* has red flowers with long-exserted stamens.

13. SANCHEZIA FILAMENTOSA Lindau, Bull. Herb. Boiss. II. **4**: 314. 1904.

Type collected by Ernst Ule (no. 6401) near Ponge de Cainarachi, Province of Loreto, Peru.

A shrub 1 to 3 meters high, producing pubescent purple flowers with long-exserted stamens. It is very distinct from all other species of *Sanchezia* in the long-attenuate bracts, bractlets, and sepals.

14. **Sanchezia parviflora** Leonard, sp. nov.

A glabrous shrub; stem quadrangular; leaves oblong-elliptic, 10 to 25 cm. long, 3 to 6 cm. broad (the lower probably larger), obliquely acuminate at apex, narrowed at base to a short winged petiole, entire or undulate, bearing cystoliths on both surfaces, the lateral veins 10 to 11 on each side of the midrib; inflorescence small, paniculate, 10 to 15 cm. long, the flowers 1 to 3 in the axils of the bracts; bracts oblong to linear-lanceolate, 1 to 2 cm. long, 2 to 3 mm. broad, acuminate; bractlets about 1 cm. long, 4 to 5 mm. wide; sepals oblong-lanceolate, about 2 cm. long, 3 to 5 mm. broad, acute at apex; corolla pale scarlet, the tube 3 cm. long, 6 to 7 cm. broad at throat, narrowed to 3 cm. at base, glabrous or sparsely pubescent without, pubescent at the insertion of stamens within, the lobes oblong, 4 mm. long, 2.5 cm. broad, emarginate; stamens inserted on the corolla tube about 5 mm. above the base, the filaments 2.2 to 2.5 cm. long, included or but slightly exserted, glabrous or sparsely pilose above, densely pubescent below, the anthers 5 mm. long, pubescent; staminodes 6 to 7 mm. long, pubescent below; style 2.5 to 2.7 cm. long, glabrous; fruit not seen.

Type in the U. S. National Herbarium, no. 1,196,194, collected between Santa Rosa and La Chorita, Province of Oro, Ecuador, altitude below 100 meters, August, 1923, by A. S. Hitchcock (no. 21127).

This species is well marked by the small red corolla, small inflorescence, and obliquely tipped leaves. *Sanchezia ovata* Ruiz & Pavón is described as having flowers 3 cm. long, but it has yellow flowers, a spicate inflorescence, and pubescent leaves.

15. SANCHEZIA LORANTHIFOLIA Lindau, Bull. Herb. Boiss. II. **4**: 314. 1904.

Type collected by Ernst Ule (no. 6820) along the Cumbaso River near San Pedro, Province of Loreto, Peru.

A shrub 1 to 3 meters high with red flowers and long-exserted stamens.

16. SANCHEZIA LONGIFLORA Hook. f.; Planch. Fl. Serr. Jard. **23**: 257. *pl. 2460*. 1883.

Ancylogyne longiflora Hook. in Curtis' Bot. Mag. **92**: *pl. 5588*. 1866.

This plant was introduced into Europe about 1868 by Pearce, who collected it near Guayaquil, Ecuador. It is very well marked by the "bright vinous-purple" corolla and the lance-subulate sepals.

17. SANCHEZIA SPRUCEI Lindau, Bull. Herb. Boiss. **5**: 648. 1894.

Type collected near Tarapoto, eastern Peru, by Spruce (no. 4325). Specimen of type collection seen in the Gray Herbarium.

S. sprucei is related to *S. parviflora* Leonard but differs in having smaller leaves, larger flowers, and tomentose stems and sepals.

18. SANCHEZIA PARVIBRACTEATA Sprague & Hutchinson, Kew Bull. Misc. Inf. 253. 1908.

Sanchezia sprucei salvadorensis Donn. Smith, Bot. Gaz. **44:** 116. 1907.

The original description was made from a plant cultivated at Kew. Its type locality and original collector are not mentioned.

The type of *S. sprucei salvadorensis*, cultivated in the city of San Salvador, Salvador, was collected by Velasco (no. 6985). So closely does the short original description of this plant agree with *S. parvibracteata* that the writer, although he has not seen the type specimen, has reduced it to synonymy.

Sanchezia glaucophylla is a horticultural variety introduced into Europe from Brazil. It was mentioned[9] in a report of the Russian International Horticultural Exhibition, held in St. Petersburg in 1869, and there described as a plant with " large ovate-acuminate leaves, veined with yellow" and with a red line on the midrib. This plant was undoubtedly what is now called *S. parvibracteata.*

A shrub about 1 meter high, commonly cultivated for its large panicle of beautiful yellow flowers and its yellow-veined leaves.

Specimens examined:

GUATEMALA: In garden, Department of Quezaltenango, *Rojas* 165 (N).

EL SALVADOR: Cultivated in San Salvador, *Standley* 19362 (N, Y, G); *Calderón* 588 (N, G). Cultivated in Santa Clara, Department of Ahuachapán, *Padilla* 173 (N).

JAVA: Cultivated in the Buitenzorg Botanical Garden, *Merrill* in 1902 (N, Y).

AMBOINA: *Robinson* 1787 (N, G).

Cultivated: Botanical Garden of Harvard University in 1874 (G).

19. **Sanchezia ecuadorensis** Leonard, sp. nov.

Shrub 2 to 3 meters high; stem quadrangular, glabrous; petioles about 2 cm. long, glabrous, winged, connate at base; leaf blades obovate, about 25 cm. long, 8 to 10 cm. wide (the uppermost leaves much smaller, obovate-lanceolate), rounded and abruptly acuminate at apex, gradually narrowed at base, shallowly undulate, both surfaces glabrous and covered with cystoliths 0.5 to 1 mm. long, the lateral veins 10 to 11 on each side of the midrib; inflorescence sparingly branched, the flowers 2 to 4 in the axils of the bracts and forming fascicles 1 to 1.5 cm. wide; bracts obovate, 14 to 16 mm. long, 7 to 8 mm. wide, dark red, glabrous; bractlets similar, 11 to 12 mm. long, 4 to 5 mm. broad; sepals narrowly oblong-obovate, 15 to 20 mm. long, 4 to 7 mm. broad, obtuse at apex, the tip pubescent; corolla yellow, the tube 4 to 4.5 cm. long, 8 mm. wide at throat, narrowing below the middle to 4 mm. at base, minutely pubescent above, glabrous below, the lobes 5 mm. long, 3 mm. wide, emarginate; stamens slightly or not at all exserted, the filaments 16 mm. long, attached to the corolla tube 8 cm. above the base, pilose; staminodes 10 to 13 mm. long; style 4 cm. long, glabrous; fruit not seen.

Type in the U. S. National Herbarium, no. 1,196,543, collected on the banks of the Pastaza River, between Baños and Cashurco, Province of Tungurahua, Ecuador, altitude, 1,300 to 1,800 meters, September 25, 1923, by A. S. Hitchcock (no. 4833).

Sanchezia ecuadorensis is related to *S. loranthifolia* Lindau. It closely resembles that species in many respects but differs in having yellow, not red, flowers and included or very slightly exserted stamens.

[9] Gard. Chron. 587. 1869.

ETHNOLOGY.—*Notes on the mental assimilation of races.*[1] JOHN R. SWANTON, Smithsonian Institution.

Since physical race mixture may be detected and in some degree weighted by means of measurements and color charts, the question naturally arises whether there are analogous differences of a psychological character which may also be identified. If so, one good test should present itself when individuals of a certain race have been adopted or captured at an early age by those of another and have been brought up wholly immersed in the culture of that other. If there is an actual psychological distinctness between the two, it should be recognized in the adopted or captured individuals as an element unaccountable on the basis of their cultural surroundings. In the course of a somewhat extended reading of miscellaneous works dealing with the Indians of North America the writer has gone over a number of narratives of white children brought up among the natives and during this work it occurred to him to take notes of these cases along with the impressions which the individuals in question made upon those who observed them. In a few cases we have the testimony of the individuals themselves. It must be remembered that no idea can be given of the number of captives who never became reconciled to their new surroundings and who escaped or died, but the general testimony of early writers is that such failure to assimilate seldom occurred in the case of a child provided it was able to endure the hardships of its first years of captivity.

It may be well to begin with the experiences of John D. Hunter, whose Memoirs, in spite of the over-polished style into which his editor has cast them, bear upon the whole the stamp of reliability. Hunter himself was a white captive of the class with which we are concerned. Carried away, when a boy, by a band of Kickapoo, he passed temporarily into the hands of a body of Pawnee and then in succession to the Kansa and Osage tribes. While he ultimately returned to live among the whites and, as in many another case, became something of a lion there, it is evident from his narrative that a slight change in the course of events would have resulted in a permanent sojourn with his adopted people.

More important than Hunter's own experience, however, are several cases of white captives mentioned by him in the course of his narrative. Thus, in the band of Kickapoo which originally took him

[1] Received Oct. 1, 1926.

prisoner was a white woman, married to a chief, who, he says, "joined with, and I believe surpassed, the squaws in the extravagancy of her exultations and rejoicings on account of the safe return of the warriors with prisoners, scalps, and other trophies obtained from their vanquished foes," i.e., the whites.[2] Farther on we find the following:

> I may here observe that I met three or four white children, apparently of my own age, while travelling among the different tribes. They appeared, like myself, to have been at first forced to assume the Indian character and habits; but time and a conformity to custom had nationalized them, and they seemed as happy and contented as though they had descended directly from the Indians, and were in possession of their patrimony. . . . . It is a remarkable fact, that white people generally, when brought up among the Indians, become unalterably attached to their customs, and seldom afterwards abandon them. I have known two instances of white persons, who had arrived at manhood, leaving their connections and civilized habits, assuming the Indian, and fulfilling all his duties. These, however, happened among the Cherokee.[3]

Another white captive, John Tanner, like Hunter, broke away from his adopted people, the Chippewa, long enough to have his memoirs incorporated into a book, but he afterward returned to the forest and Schoolcraft says of him that he had "lost every virtue of the white man, and accumulated every vice of the Indian (!)."[4]

Among the Indians living near the Wabash in the eighteenth century, Gerard Hopkins, a missionary belonging to the Society of Friends, saw a white girl captive who could only be distinguished from the Indians by her gray eyes.[5]

In the same region, Charles Johnson, himself a captive of the Wyandot, noted two others living like all the rest, and one of them able to use only broken English. The other had been promoted to the rank of a chief.[6]

Isaac McCoy, in his History of the Baptist Missions, recounts the case of a white man "by the name of Fish, who had lived with the Shawanoes from a small boy, and was in all respects identified with them, had become a principal chief of a clan who had lived many

[2] *Memoirs of a Captivity among the Indians of North America*, JOHN D. HUNTER. London, 1823, p. 6.

[3] Ibid., p. 14.

[4] *Personal Memoirs of a Residence of Thirty Years with the Indian Tribes*. HENRY R. SCHOOLCRAFT. Philadelphia, 1851, p. 316.

[5] *A Mission to the Indians from the Indian Committee of Baltimore Yearly Meeting, to Fort Wayne, in 1804*. GERARD T. HOPKINS, Philadelphia, 1862, p. 64.

[6] *A Narrative of the Incidents Attending the Capture, Detention, and Ransom of Charles Johnson*. New York, 1827, pp. 61, 67.

years in the State of Missouri, and which was in a good degree civilized."[7]

The Rev. David Jones in "A Journal of Two Visits Made to Some Nations of Indians on the West Side of the River Ohio, in the Years 1772 and 1773," speaks of meeting a white lad, who was a captive, and says, "When I spoke to him [I] was very sorry to see him shake his head and reply, '*Motta keeno toleeh neekaana*,' i.e., I do not understand you, my friend."[8] He also speaks of two white women among the Indians, one of whom had married a chief. He adds, "These women were captives, and it is likely from childhood, for they have the very actions of Indians."[9]

One of the Gilbert family, Benjamin Gilbert, jun., who had been carried away by the Iroquois, came to be "considered as the king's successor, and entirely freed from restraint, so that he even began to be delighted with his manner of life; and had it not been for the frequent counsel of his fellow captives, he would not have been anxious for a change."[10]

Better known than any of the above is the case of Eunice Williams, taken by Iroquois in the massacre at Deerfield, Mass., in 1704. Her father was a minister, and she had been brought up in the strictest principles of Puritanism, but three years after she had been carried off she was unwilling to break with her new life. This refusal was repeated several times, and in 1713 she married a young Indian. In 1740, in company with other Indians, she revisited the scenes of her childhood and repeated the journey twice afterwards, but she had lost her knowledge of English entirely and even refused to sleep in a white man's dwelling.[11]

Another instance is that of John Slover, who was among the Indians from his eighth to his twentieth year. He says, "At the treaty of Fort Pitt, in the fall preceding what is called Dunmore's War . . . . I came in with the Shawanese nation to the treaty, and meeting with some of my [white] relations at that place, was by them solicited to relinquish the life of a savage, which I did with some reluctance, this

[7] *History of Baptist Indian Missions.* ISAAC MCCOY. Washington and New York, 1840, p. 405.

[8] *A Journal of Two Visits Made to Some Nations of Indians on the West Side of the River Ohio, in the Years 1772 and 1773.* Rev. DAVID JONES. New York, 1865, pp. 85, 86.

[9] Ibid., p. 88.

[10] *A Selection of Some of the Most Interesting Narratives of Outrages, Committed by the Indians in their Wars with the White People.* ARCHIBALD LOUDON. 2 vols., Carlisle, 1808 (reprinted in 1888), **2**: 126.

[11] *An Unredeemed Captive.* CLIFTON JOHNSON, 1897, pp. 41–52.

manner of life having become natural to me, inasmuch as I had scarcely known any other."[12]

That there was little natural sympathy between white captives at times, is shown by the experience of John M'Cullough, who was also captured when a boy. He was accused of killing an Indian boy, he says, "which I always denied, but *Queek-queek-co-mooch'-que*, a little white girl (a prisoner), who lived with the family that the deceased belonged to—was like to be the worst evidence against me, she told them that she saw me have the pistol in my hands several times." When M'Cullough was purchased from the Indians by his father, instead of being grateful, he wept bitterly and had to be carried away tied to a horse. Later he escaped and returned to his adopted people. He reports the same of two other white captives.[13]

John Brickell was carried off by some Delawares and lived with them in Ohio for many years. In the narrative of his experiences he commends the Indian method of bringing up children in the highest terms and says "I know I am influenced to good, even at this day, more from what I learned among them, than what I learned among people of my own color." When his Indian father asked him if he would return to the whites or remain with him, he "Was silent a few minutes, in which time it seemed as if I thought of almost everything. I thought of the children I had just left crying; I thought of the Indians I was attached to, and I thought of my people which I remembered; and this latter thought predominated, and I said, 'I will go with my (white) kin.' "[14]

In a band of Chippewa living near the Assiniboine River Harmon saw a white captive of whom he says, "this fellow is lost, beyond recovery, for he now speaks no other language, but that of the Indians, among whom he resides, and he had adopted all their manners and customs; and it would now be as difficult to reconcile him to the habits of civilized life, as it would be, were he a real Indian."[15]

At a much later date Col. Henry Inman reports the case of a white girl who had been left among the Blackfeet when a baby and who appeared to be no different psychologically from the Indians about her.[16]

[12] LOUDON, ARCHIBALD. Op. cit., 1: 21.

[13] Ibid., p. 264.

[14] *Narrative of John Brickell's Captivity among the Delaware Indians.* The American Pioneer, ed. 2. 1: 46–48, 54, Cincinnati, 1842.

[15] *A Journal of Voyages and Travels in the Interiour of North America, etc.* DANIEL WILLIAMS HARMON. Andover, 1820, p. 141.

[16] *Buffalo Jones' Forty Years of Adventure.* Col. HENRY INMAN. Topeka, Kans., 1899, pp. 282–286.

Fanny Kelly, a captive among the Dakota, tells of another white girl whose family had been destroyed by cholera and who had been found and reared by that tribe. She lived and acted exactly like those who had adopted her. A white boy, cited by Miss Kelly, lived for many years in the same condition but, later, becoming discontented, left them and became an interpreter and trader.[17]

Some Americans and a great many Mexicans were carried off by the Comanche, Kiowa, and other tribes of the southern Plains. About the year 1847 Schoolcraft, in speaking of the first mentioned, says: "There are a number of Mexican juvenile prisoners among them. Those I saw were reluctant to being released."[18] A Texan named Nelson Lee, in an account of his captivity among the same Indians, tells of four girl captives who seemed to live and behave exactly like the rest of the Indians.[19] The Rev. J. J. Methvin, a missionary on the southern Plains, narrates the life of a Mexican Kiowa captive named Andele who was finally reclaimed from them and became a missionary. He was taken by them "when a boy, and raised among them, and in ways and habits and dress was scarcely distinguishable from the real Indian." In three years "he had learned many things of the Indian life and had accepted them all." Somewhat later "he took up his time in studying the Indian ways, for he had now come to believe all their superstitions, and engage in their worships. He had caught the spirit of their aspirations, and he hoped to be a great war chief. He thought the Indian idol or 'medicine,' would pity him and help him, and so he cried to it, and often at night he would get up, go to the medicine man, worship, and offer a blanket or bit of property he possessed." At one time he strove to cure a wounded man and he contemplated the purchase of a shield.[20]

It may very properly be objected that as most Mexicans themselves have Indian blood the testimony of Mexican captives is inconclusive. However, while Andele was among the Kiowa, they had with them also a Texas boy captured at the age of five, adopted, and given the name Tahan, who seems to have been as thoroughly Indianized as any of the Mexicans. "At the time of this outbreak near Anadarko,

[17] *Narrative of my Captivity among the Sioux Indians.* FANNY KELLY. Chicago, 1880, pp. 138–141.

[18] *Historical and Statistical Information respecting the History, Condition and Prospects of the Indian Tribes of the United States,* 1: 235. Philadelphia, 1851–57.

[19] *Three Years among the Comanches.* NELSON LEE. Albany, 1859, pp. 158–9.

[20] *Andele, or the Mexican-Kiowa Captive.* Rev. J. J. METHVIN. Louisville, 1899, pp. 40, 77, 99, 105–8.

Tahan was about eighteen years old, and was as complete an Indian in habits, customs, and superstitions, as the most extreme Indian, and was as bitter and cruel in purpose [pursuit?] of bloodshed and plunder." He was captured by soldiers but escaped and returned to the Indians where he was finally killed by a Kiowa chief.[21] Several other captives are mentioned who, when returned to their friends, "had forgotten their names and every word of English."[22] Another writer speaks, indeed, of a Texas boy who was kept by the Comanche for a year and then sold to the Mexicans because he would not adopt Indian ways of living, but this is unusual, and it cannot mean that the boy in question was of exceptionally high mentality because his case is more than offset by that of the Parker children. One of these became a noted Comanche chief, while his sister married in the tribe and became the mother of the famous head chief Quana Parker.[23]

Two cases are of particular interest, the first because it is an intimate and lengthy personal narrative, the second because it has received little or no editing and presents a most vivid picture of Indian life from the inside.

The hero of the first narrative was a Mormon boy, Elijah Nicholas Wilson, well known in Utah as "Uncle Nick." He was induced, by the promise of a pinto pony, to run away from home and was adopted by the mother of the noted Shoshoni chief Washakie. He was then twelve years old and lived two full years among the Indians before returning to his own people. During this time he had no desire to leave his new friends, and he became as strongly attached to his Indian mother as if she had been his own. At the same time he was old enough when he left the whites to be able to view his aboriginal associates and their customs with some sort of critical discrimination. Absorption in the new life was by no means complete.[24]

The second case was that of Herman Lehmann, belonging to a German family settled in Texas. In his eleventh year this boy and his brother were captured by a band of Apache, but, while the brother escaped shortly afterward, he remained with the Indians five years, first among the Apache and later with the Comanche. Unlike Wilson's story, this narrative shows an utter abandonment to the life of the

[21] Ibid., pp. 118–127.

[22] Ibid., p. 133.

[23] *Handbook of American Indians*, Bull. 30, Bur. Amer. Ethnol., article *Quana Parker;* also see work by JONATHAN H. JONES cited below.

[24] *Among the Shoshones.* ELIJAH NICHOLAS WILSON. Salt Lake City, 1910.

red man, in which the hero came to share all of the customs and prejudices of his associates, including their profound dislike of white people, and in which he continually took part in raids, even against his own people, and was as little disturbed as his companions at the taking of human life or any sort of atrocity. So great was his devotion to this manner of existence that he was a member of the last band of irreconcilable Comanche brought in through the intervention of Quana Parker. Here are some excerpts from his narrative:

> We were all camped down near the southern border of the plains and twelve of us in one party (several other parties left at the same time thus leaving the squaws almost unprotected) came down the San Saba river to where it empties into the Colorado and then crossed over to the Llano river and up it to Llano town collecting horses as we went for we were not traveling for our health. There we came in contact with teamsters, fought them, killed them, scalped them, burned their wagons, drove away their horses and felt happy.
>
> Our scouts reported that the rangers were following us so we scattered out and gave them the dodge. The rangers never caught us but when we reached camps with all our booty we found that all of our women had been killed or captured except ten and all the men but two Indians and a Mexican who had married one of our women and been admitted into the tribe. . . . .
>
> Just fifteen warriors left and ten women! We bury the dead and follow the soldiers toward Ft. Griffin and somebody steals nearly all of our horses; we fail to recover our women. We return to the plains, steal out the camps of buffalo hunters, kill the men and get their guns, but the soldiers were after us all the time.
>
> One day we met a company of soldiers but were not strong enough to fight them, so we dodged them and went into Sandy Hills and on across to the Pecos and there met more United States troops and we were driven back across the plains. There was no rest nor peace for us poor Indians. We killed meat and prepared for winter, six of us went near Ft. Griffin and stole a nice herd of the horses kept by soldiers and as we came back we passed a ranch and drove eleven more good trained horses into our herd and we reached camps with five choice animals.
>
> We moved further out into the plains and met ten buffalo hunters and had a hard fight; we ran these fellows out of the country. We then hunt, ride bronchos and have a good time. . . . .
>
> . . . . We went into Mexico with our gold [obtained from a mine they had discovered] and got all the guns, ammunition and horses we wanted. . . . .
>
> We made a treaty with the Mexicans; attended a Mexican dance; drank mescal and cheap whiskey; got into a row and had to leave the country in short order, but the Mexicans offered us peace and protection again if we would locate the gold mine for them but this we would not do, not that we thought the metal so valuable but because we thought more palefaces would come.[25]

[25] *A Condensed History of the Apache and Comanche Indian Tribes for Amusement and General Knowledge, Prepared from the General Conversation of Herman Lehmann, Willie Lehmann, Mrs. Mina Keyser, Mrs. A. J. Buchmeyer and Others.* JONATHAN H. JONES. San Antonio, 1899, pp. 178–179.

After they had been brought into the reservation

One Indian proposed to me that we steal a girl apiece and run away. I went and talked to my old girl that nursed me when her father shot me and she consented to go. We were to meet that night. My chum stole another man's wife, two good horses and other necessities and made good his escape. My girl was true to her promise, stole all the goods she could carry and waited for me until nearly daylight. I started and was nearly to where my girl was when the soldiers who had been secretly watching me made a drive for me. I ran off of a bluff and fell into the river and came near freezing and eventually was driven back to camps and so many soldiers watched me that I had no chance of escape.[26]

We came on to Ft. Griffin and all these soldiers got on a whiz, stole my money and all went to the "lockup" and a new outfit brought me on but I was allowed to kill game and do pretty much as I pleased but they kept an eye on me all the time. We came on to a big hole of water and there these soldiers caught big bull frogs and fried them in lard—bah! I quit camps! That was a violation of a sacred treaty that we had made years ago with the Carancahuas and therefore against our religion. I would not eat with those soldiers any more; I cut off meat and roasted it on an iron. Frogs and swine, both water or mud animals, too much for me! . . . . [27]

He was at length brought back to his own people in Texas, but

. . . . I was homesick and was planning, scheming and contriving to run away; I would much rather have gone back on the plains along with the birds, wild animals and Rosanante [his horse] but finally I went in to the table and was just going to sit down when I saw a fine swine ham smoking hot on the table. I kicked over everything in my reach and made for the door but they stopped me and entreated me not to do that way but come and eat. . . . .

I sat around and smoked cigarettes, one thing I did enjoy was good tobacco; went down to the creek, made a bow and a great many arrows, sang all the time like a Comanche and waged war against the 'hog family.' Whenever a shote came in sight I would kill him, no matter to whom he belonged.

I would saddle up my Comanche pony and go out hunting. Somebody gave me a Winchester and my step-father furnished me with cartridges. Willie [his brother] always went with me to watch me and teach me. I wanted to steal calves but Willie told me that was wrong. I insisted that we take all the horses we saw but Willie would not allow that so I was mad all the time, in fact, nothing pleased me.

When I met children I would give a yell and draw my bow on them just to see them run and that was all the real enjoyment I had.

I would kill deer, put them on my pony, ride up to the gate, dismount and leave the horse and deer there. If anybody wanted the deer they had to go skin and clean them, I would not; and somebody had to feed my pony too for I thought work of that kind was for squaws. I was furious if they failed to roast me the short-ribs or tenderloins but my people tried to do everything to please me for several months and I began to learn to behave.[28]

[26] Ibid., p. 187.
[27] Ibid., p. 189.
[28] Ibid., pp. 191–192.

Of about thirty cases of captivity, fifteen males and fifteen females, three or four of the males became chiefs and three of four of the females chiefs' wives, but the proportion does not appear to be above what might have been expected. It may be added that of about seventy chiefs and noted men in the collection of McKenney and Hall only about one-tenth are known to have had white blood. The percentage warrants no deduction of white superiority.

It is important to notice that the factors tending to prevent assimilation of captors and captured were (1) the physical differences between them and (2) knowledge that there was a difference in origin. I place these in the order of value, for while the first constituted an indelible mark which could be understood by stranger as well as acquaintance, the latter could operate only with a few and would rapidly fall out of memory without the other to keep it alive. Hunter was taunted by the Indian boys on account of his color and he adds: "I also met some [mixed-bloods], whose parents, either on the side of the father or mother, had been white; they sustained the character of brave warriors; but in general no cast, differing from that of the tribe, is held in repute or estimation."

Numerous instances might be cited in confirmation of what Hunter says. In other words, the barriers to complete amalgamation between the Indians and their captives were failure to conform to the physical and cultural type demanded by the former, but whereas it seems to have been possible to bring about complete cultural conformity, equal physical conformity was unattainable. We find the same difficulty when absorption of Indians by whites is in question. As a social being, man, if not admitted to social intercourse in one group will usually allay himself with another. This, rather than racial urge, is, I believe, the explanation of those frequently cited instances in which an individual of some race, Indian or other, has been taken from his people, highly educated and, after an apparent conformity to white ways, returns to his people and throws his civilized acquirements entirely aside. In most cases this means that he has not been accepted by his European associates on equal terms. In others it may be that the returns to his old life merely because circumstances have separated him from his white associates and he has reabsorbed the culture of his own people just as we have seen white people absorb it for the first time when thrown continually in contact with it.

A most incisive statement of this process and a still more sinister result of its failure was given many years ago by some New England missionaries. It runs as follows:

An Indian youth has been taken from his friends and conducted to a new people, whose modes of thinking and living, whose pleasures and pursuits are totally dissimilar to those of his own nation. His new friends profess love to him, and a desire for his improvement in human and divine knowledge, and for his eternal salvation; but at the same time endeavour to make him sensible of his inferiority to themselves. To treat him as an equal would mortify their own pride, and degrade themselves in the view of their neighbours. He is put to school; but his fellow students look on him as a being of an inferior species. He acquires some knowledge, and is taught some ornamental, and perhaps useful accomplishments; but the degrading memorials of his inferiority, which are continually before his eyes, remind him of the manners and habits of his own country, where he was once free and equal to his associates. He sighs to return to his friends; but there he meets with the most bitter mortification. He is neither a white man nor an Indian; as he had no character with us, he has none with them. If he has strength of mind sufficient to renounce all his acquirements, and resume the savage life and manners, he may possibly be again received by his countrymen: but the greater probability is, that he will take refuge from their contempt in the inebriating draught; and when this becomes habitual, he will be guarded from no vice, and secure from no crime.[29]

While the cases brought together in this paper tell much the same story, the number should be very much increased, similar studies of white captives among other peoples of the world should be made, and the whole checked by reciprocal cases of captives from the various primitive races held by whites.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

GEOLOGICAL SOCIETY

405TH MEETING

The 405th meeting was held in the Cosmos Club April 22, 1925, President STEPHENSON presiding and 56 persons present. The Secretary announced the election to active membership of C. E. BATSCHELET, and V. A. POTTER.

Program: HAROLD T. STEARNS: *The great explosions of Kilauea Volcano in 1924.* (Illustrated with lantern slides.) Kilauea Volcano is located on the island of Hawaii, and rises 4,040 feet above sea level. On its summit is Kilauea caldera and Halemaumau, the "Pit of Everlasting Fire." The molten lava disappeared from view in Halemaumau on February 21, 1924, and left a pit 380 feet deep. Thirty-six local earthquakes occurred during February.

Seventy-eight earthquakes were recorded during March, many of which originated along the northeastern rift of Kilauea. No lava was visible during March. On April 29, there was a marked subsidence of the bottom of Halemaumau, and on the 30th, the bottom had sunk to 500 feet below the rim. Seismic activity increased during April, and on April 22–23, pronounced cracking and faulting began at Kapoho, 30 miles east of Kilauea. Fault

[29] From a report prepared by a committee consisting of Jeremy Belknap and Jedidiah Morse and printed in the Collections of the Massachusetts Historical Society, 1st series, 5: 29–30.

scarps 8–12 feet high, and fissures 15 feet wide developed. Three hundred and fifty-eight earthquakes were recorded at Kilauea Observatory during April. This faulting doubtless indicated a subsidence of the lava in the northeast rift.

At the end of the first week in May, the bottom of Halemaumau had subsided to 700 feet below the rim. During the night of May 10–11 the first explosion occurred. This small explosion was the beginning of the first explosive phase of Kilauea ever witnessed by white men. Explosions continued with increasing violence until they reached a maximum on Sunday morning, May 18. The maximum earthquake frequency, however, did not occur until May 24. The explosions of the morning of May 18 sent up a tight cauliflower cloud that reached a height of about 4 miles. A 10-ton block was hurled 3,500 feet from the crater of the pit, and ash fell 25 miles away. The dust cloud accompanying the great explosions of May 18 probably rose at the rate of 75 to 100 feet a second. Explosions continued at more or less regular intervals with decreasing intensity until May 27 when the pit returned to a condition of steaming, alvalanching, and dust-making, similar to the period before May 11.

Three thousand nine hundred and sixty-one local earthquakes, and one teleseism were registered at the Observatory during the month of May. Lightning and thunder storms frequently accompanied the explosions.

No magmatic ejectamenta, no pumice, no cinders, nor Pele's hair were thrown out during the explosions. The projectiles consisted entirely of blocks of rock torn from the throat of Halemaumau. All evidence points to a phreatic origin for these steam explosions. The phenomenal collapse of the pit, the absence of magmatic ejecta, the low temperature, and other associated phenomena indicate that the lava column subsided below the ground water level under Kilauea. Ground water then entered the fissure-shaft and was heated by either hot rock or rising gas. The steam rose and collected under the talus plug in the bottom of Halemaumau until sufficient pressure had accumulated to blow out the plug. This process was repeated at more or less regular intervals until the plug no longer held or the supplying energy was dissipated. (*Author's abstract.*)

C. E. VAN OSTRAND: *A possible dependence of deep earth temperatures on geologic structure.* (Illustrated with lantern slides.) The paper consisted chiefly of a brief review of some recent observations of temperatures in deep wells located in nine different oil pools in Wyoming. In five of the fields, Rawlins, Rock River, Big Muddy, Grass Creek, and Pine Mountain, the temperatures increase at the rate of about 1°F. in 50 to 60 feet, but in the remaining four pools, Warm Springs, Salt Creek, Lance Creek, and Lost Soldier, the rate ranges from 1°F. in 21.0 feet to 1°F. in 35.1 feet. A limited number of observations in the Lost Soldier and Warm Springs pools indicate a variation of temperature with reference to the structure—the highest temperatures apparently being found on the top of the structure. The results of 22 observations in the Salt Creek field have been used by W. T. Thom, Jr., as a basis for the construction of a map showing the lines of equal rate of temperature increase. A composite map was used to show that the lines of equal rate of temperature increase are closely related to the contours on the usual contour map of the structure. As indicated in the other two pools, the highest temperatures at a given depth appear to be on the top of the structure. (*Author's abstract.*)

CHARLES BUTTS: *New light on the Talladega (Ocoee) rocks of Alabama.*

EDWARD SAMPSON, J. D. SEARS, *Secretaries.*

SCIENTIFIC NOTES AND NEWS

KIRK BRYAN and G. M. HALL, of the Water Resources Branch of the Geological Survey, have left Washington to assume their new duties on the teaching staffs respectively of Harvard University and the University of Tennessee.

A. E. FATH, formerly of the U. S. Geological Survey, recently visited Washington on his return from Europe, where he has been employed for three or four years in petroleum researches for the Vacuum Oil Company.

T. A. JAGGAR, in charge of the section of volcanology of the U. S. Geological Survey, has returned to the Hawaiian Volcano Observatory and will be assisted by R. M. WILSON and R. B. HODGES. R. H. FINCH has been assigned to take charge of the newly established Lassen Volcano Observatory at Lassen Peak, California.

OLIVE C. POSTLEY has been appointed Junior Geologist on the U. S. Geological Survey.

Dr. H. L. SHANTZ, of the Bureau of Plant Industry, U. S. Department of Agriculture has resigned and gone to the University of Illinois as professor of botany, succeeding Dr. WILLIAM TRELEASE, retired.

Dr. ARTHUR W. HILL, Director of Kew Gardens, England, spent some days in Washington, visiting the National Herbarium and studying methods of plant quarantine at the U. S. Department of Agriculture.

ELLSWORTH P. KILLIP and ALBERT C. SMITH, of the U. S. National Herbarium, left October 18 for Cartagena, Colombia, to carry on botanical exploration in the northern and eastern parts of that country. The work is a part of the project undertaken by the National Museum, the New York Botanical Garden, and the Gray Herbarium of Harvard University, for botanical investigations in northern South America. The Arnold Arboretum is also cooperating in the present expedition. Mr. KILLIP and Mr. SMITH expect to spend about six months in the field, exploring the coastal area about Cartagena and the little-known parts of the eastern Cordillera.

Dr. H. U. SVERDRUP sailed from New York, October 14, on the HELIG OLAF, for Norway, to take up the duties of Director of the Geophysical Institute B, at Bergen.

Mr. J. A. FLEMING returned to Washington on September 16, after a six-weeks' trip to California and Canada, during which he made arrangements for the installation of a horizontal intensity variometer at Mt. Wilson Observatory, and inaugurated a program of cooperative magnetic and astronomic observations during times of magnetic disturbances.

R. W. GORANSON, of Harvard University and S. B. HENDRICKS, of the California Institute of Technology, joined the staff of the Geophysical Laboratory, Carnegie Institution of Washington in September.

J. W. GREIG of the Geophysical Laboratory, who has been on a year's leave of absence, part of which was spent at Harvard University and part with the Canadian Geological Survey, resumed his work at the Laboratory in October.